APS DISTRICT HIGH SCHOOL SCIENCE CURRICULUM FRAMEWORK

Course Title: Biology I **Course Number:** SEE BELOW

Department: Science **ADS Number:** SEE BELOW

Prerequisites: None

Length of Course: One Year **Credit/PRI Area:** .50 per Sem/Science **Grade Level(s):** 9 - 12

COURSE AND ADS NUMBERS:

Biology I	41111	17114144
Biology I Bilingual	4111B	17118144
Biology I	060MD	17112144
Biology I	061MD	17112144
Biology I	062MD	17112144

Important Notes:

COURSE DESCRIPTION: This laboratory course* is designed to provide information regarding the fundamental concepts of life and life processes. Topics covered include, but are not restricted to, cell structure and function, biochemistry, genetics, ecology, evolution, taxonomy, and certain aspects of earth science. Reading, writing, and speaking strategies are inculcated in the course.

*Lab Courses: A minimum of 250 minutes per week of directed class activity for 36 weeks, 40% of which must be lab oriented, for a total of 150 clock hours (90 hours of class plus 60 hours of lab) shall be required for one (1) unit of credit, excluding passing period. [APS Procedural Directives, Section I – Instruction, Basis for offering credit].

References in parentheses following each performance standard refer to and align with the State of New Mexico Science Standards (NM), the Albuquerque Public Schools Mathematics Standards (APS – MA), and the Albuquerque Public Schools Language Arts Standards (APS - LA).

STRATEGIES:
The "Illustrations" column in the *Program of Studies* provides exemplars of the performance standards, strategies, and best practices suggested by the science teachers in the Albuquerque Public Schools (APS).

ASSESSMENTS:
Assessments may include the following: authentic and performance-based assessment, cooperative learning, teacher observations, checklists, tests and exams, formal and informal writing, small group and full class discussions, oral and multimedia presentations, projects, demonstrations, and portfolios. Assessments are based on appropriate rubrics.

SUGGESTED TEXTBOOKS AND INSTRUCTIONAL MATERIALS:

- Current state adopted science textbooks
- Supplementary materials
- Computers
- Computer software
- Microscopes
- Dissecting kits

SUGGESTED TITLES/AUTHORS WEB SITES:

Approved by HSCA: 12/04

STRAND I: SCIENTIFIC THINKING AND PRACTICE
CONTENT STANDARD: The student understands the processes of scientific investigations and uses inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.

BENCHMARKS:
A. The student uses accepted scientific methods to collect, analyze, and interpret data and observations and to design and conduct scientific investigations and communicate results.
B. The student understands that scientific processes produce scientific knowledge that is continually evaluated, validated, revised, or rejected.
C. The student uses mathematical concepts, principles, and expressions to analyze data, develop models, understand patterns and relationships, evaluate findings, and draw conclusions.

GRADE 9 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	1. Describes the essential components of an investigation, including appropriate methodologies, proper equipment, and safety precautions (NM – I.I.I.1). 2. Designs and conducts scientific investigations that include (NM – I.I.I.2): • testable hypotheses, • controls and variables, • methods to collect, analyze, and interpret data, • results that address hypotheses being investigated, • predictions based on results, • re-evaluation of hypotheses and additional experimentation as necessary, and • error analysis. 3. Uses appropriate technologies to collect, analyze, and communicate scientific data (e.g., computers, calculators, balances, microscopes) (NM – I.I.I.3). 4. Conveys results of investigations using scientific concepts, methodologies, and expressions, including (NM – I.I.I.4; APS – MA IV.5E): • scientific language and symbols, • diagrams, charts, and other data displays, • mathematical expressions and processes (e.g., mean, median, slope, proportionality),	**NOTE: Illustrations include suggested activities for attaining each performance standard. A check (√) refers to a key feature to look for while assessing student performance.** 1 – 4, 6 – 16. The student properly designs and performs a controlled experiment using a recognized scientific method, gathers data, and reports results in both an oral and written format. ✓ proper safety techniques ✓ correct use of equipment ✓ appropriate equipment ✓ evidence of current scientific knowledge ✓ effective communication skills ✓ use of technology ✓ quantitative data ✓ critical thinking and insights

GRADE 9 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	• clear, logical, and concise communication, and • reasoned arguments. 5. Understands how scientific theories are used to explain and predict natural phenomena (e.g., plate tectonics, ocean currents, structure of atom) (NM – I.I.I.5). 6. Understands how scientific processes produce valid, reliable results, including (NM – I.I.II.1): • consistency of explanations with data and observations, • openness to peer review, • full disclosure and examination of assumptions, • testability of hypotheses, and • repeatability of experiments and reproducibility of results. 7. Uses scientific reasoning and valid logic to recognize (NM – I.I.II.2): • faulty logic, • cause and effect, • the difference between observation and unsubstantiated inferences and conclusions, and • potential bias. 8. Understands how new data and observations can result in new scientific knowledge (NM – I.I.II.3; APS – MA IV.1E). 9. Critically analyzes an accepted explanation by reviewing current scientific knowledge (NM - I.I.II.4). 10. Examines investigations of current interest in science (e.g., superconductivity, molecular machines, age of the universe) (NM – I.I.II.5). 11. Examines the scientific processes and logic used in investigations of past events (e.g., using data from crime scenes, fossils), investigations that can be planned in advance but are only done once (e.g., expensive or time-consuming experiments such as medical clinical trials), and investigations of phenomena that can be repeated easily and frequently (NM – I.I.II.6). 12. Creates multiple displays of data to analyze and explain the relationships in scientific investigations (NM – I.I.III.1; APS – MA IV.1E).	5. The student researches and gathers data on the distance between North America and Europe over the past 500 years, analyzes the information, records the difference between these two points - 500 years ago and now, and supports the theory of plate tectonics through sea floor spreading. The student graphs and charts the data and uses the information to discuss past movement and preduct future ones. The student makes a presentation, either orally or in written form, and justifies his/her predictions. ✓ organization of data ✓ data supports theory ✓ critical thinking/insights ✓ defense of argument ✓ clear communication ✓ graphic organizers

GRADE 9 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	13. Uses mathematical models to describe, explain, and predict natural phenomena (NM – I.I.III.2; APS – I.16, I.18). 14. Uses technologies to quantify relationships in scientific hypotheses (e.g., calculators, computer spreadsheets and databases, graphing software, simulations, modeling) (NM – I.I.III.3). 15. Identifies and applies measurement techniques and considers possible effects of measurement errors (NM – I.I.III.4). 16. Uses mathematics to express and establish scientific relationships (e.g., scientific notation, vectors, dimensional analysis) (NM – I.I.III.5).	

STRAND II: THE CONTENT OF SCIENCE – LIFE SCIENCE
CONTENT STANDARD: The student understands the properties, structures, and processes of living things and the interdependence of living things and their environments.

BENCHMARKS: A. The student understands how the survival of species depends on biodiversity and on complex interactions, including the cycling of matter and the flow of energy.
B. The student understands the genetic basis for inheritance and the basic concepts of biological evolution.
C. The student understands the characteristics, structures, and functions of cells.

GRADE 9 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	1. Knows that an ecosystem is complex and may exhibit fluctuations around a steady state or may evolve over time (NM – II.II.I.1).	1, 3, 5, 6. The student selects an ecosystem from around the school (e.g., Rio Grande, foothills, pond) and designs an energy pyramid that features the major organisms that inhabit that ecosystem. The student shows the transfer of energy from the sun through decomposers, including energy loss at each level. ✓ design of pyramid ✓ organisms appropriate for ecosystem ✓ organisms included on proper levels ✓ energy transferences properly noted at each level
	2. Describes how organisms cooperate and compete in ecosystems (e.g., producers, decomposers, herbivores, carnivores, omnivores, predator-prey, symbiosis, mutualism) (NM – II.II.I.2). 3. Understands and describes how available resources limit the amount of life an ecosystem can support (e.g., energy, water, oxygen, nutrients) (NM – II.II.I.3). 4. Critically analyzes how humans modify and change ecosystems (e.g., harvesting, pollution, population growth, technology) (NM – II.II.I.4). 5. Explains how matter and energy flow through biological systems (e.g., organisms, communities, ecosystems), and how the total amount of matter and energy is conserved but some energy is always released as heat to the environment (NM – II.II.I.5). 6. Describes how energy flows from the sun through plants to herbivores to carnivores and decomposers (NM – II.II.I.6).	2, 4. The student participates in a collection activity (e.g., colored cut out of moths, where the student becomes a predator, ping pong balls) and competes for sufficient resources (predator-prey model). After the activity the student participates in a class discussion relating results to predator-prey interactions and intraspecific competitions. [The teacher can determine some "Whys?" (e.g., Why did you live? Why did you die?)]. ✓ individual participation ✓ comprehension of interrelationships ✓ communication of ideas effectively

GRADE 9 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	7. Understands and explains the principles of photosynthesis (i.e., chloroplasts in plants convert light energy, carbon dioxide, and water into chemical energy) (NM – II.II.I.7).	7. The student designs/creates a model that simulates the process of conversion of reactants into a product (e.g., group of coins to represent elements, Rube Goldberg). ✓ understanding that a reactant differs from the product ✓ understanding of the idea that by products are products ✓ knowledge that a change in one step alters the product
	8. Understands and explains the hierarchical classification scheme (i.e., domain, kingdom, phylum, class, order, family, genus, species), including (NM – II.II.I.8): • classification of an organism into a category • similarity inferred from molecular structure (DNA) closely matching classification based on anatomical similarities • similarities of organisms reflecting evolutionary relationships.	8. The student designs a dichotomous key which allows other students to classify organisms. ✓ properly grouped organisms ✓ utility of design
	9. Understands variation within and among species, including (NM – II.II.I.9): • mutations and genetic drift • factors affecting the survival of an organism natural selection. 10. Knows how DNA carries all genetic information in the units of heredity called genes, including (NM – II.II.II.1): • the structure of DNA (e.g., subunits A, G, C, T) • information-preserving replication of DNA • alteration of genes by inserting, deleting, or substituting parts of DNA. 11. Uses appropriate vocabulary to describe inheritable traits (i.e., genotype, phenotype) (NM – II.II.II.2). 12. Explains the concepts of segregation, independent assortment, and dominant/recessive alleles (NM – II.II.II.3). 13. Identifies traits that can and cannot be inherited (NM – II.II.II.4). 14. Knows how genetic variability results from the recombination and mutation of genes, including (NM – II.II.II.5): • sorting and recombination of genes in sexual reproduction result in a change in DNA that is passed on to offspring • radiation or chemical substances can cause mutations in cells, resulting in a permanent change in DNA.	9 – 16. The student collects data from classmates, family members, and relatives and distinguishes inheritance of traits based on phenotypic ratios. He/She describes/explains why some traits are present in higher numbers than others or why the trait is in some family members but not others. The student looks for a trait (e.g., attached ear lobe, interlacing fingers, widow's peak), compares the actual ratio to the expected ratio, does a Punnett Square, and analyzes the results. Prior to this activity the student learns the proper vocabulary. ✓ understanding of vocabulary ✓ correct ratios ✓ identification of traits ✓ trait understudy is the result of dominant/recessive ✓ genes are segments of DNA ✓ analysis of results

GRADE 9 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	15. Understands the principles of sexual and asexual reproduction, including meiosis and mitosis (NM – II.II.II.6). 16. Knows that most cells in the human body contain 23 pairs of chromosomes including one pair that determines sex, and that human females have two X chromosomes and human males have an X and a Y chromosome (NM – II.II.II.7). 17. Describes the evidence for the first appearance of life on Earth as one-celled organisms, over 3.5 billion years ago, and for the later appearance of a diversity of multicellular organisms over millions of years (NM – II.II.II.8). 18. Critically analyzes the data and observations supporting the conclusion that the species living on Earth today are related by descent from the ancestral one-celled organisms (NM - II.II.II.9). 19. Understands the data, observations, and logic supporting the conclusion that species today evolved from earlier, distinctly different species, originating from the ancestral one-celled organisms (NM – II.II.II.10). 20. Understands that evolution is a consequence of many factors, including the ability of organisms to reproduce, genetic variability, the effect of limited resources, and natural selection (NM – II.II.II.11). 21. Explains how natural selection favors individuals who are better able to survive, reproduce, and leave offspring (NM – II.II.II.12). 22. Analyzes how evolution by natural selection and other mechanisms explain many phenomena including the fossil record of ancient life forms and similarities (both physical and molecular) among different species (NM – II.II.II.13). 23. Knows that cells are made of proteins composed of combinations of amino acids (NM – II.II.III.1).	17 – 22. After viewing various models and representations, the student creates a phylogenetic tree showing changes in species through a fossil record detailing subtle changes from earliest record through present form. The student explains how environmental factors support or select for one trait over another and predicts rate of change through rate of random mutations (e.g., mitochondria). ✓ proper representation of model ✓ clear explanation of why the surviving organism is fit ✓ predictions 23 – 29. The student researches with a group the cell and a specific organelle. When the research is completed, each student writes a paper based on his/her group's findings, makes a cell model, and presents it to the class. ✓ writing conventions ✓ effective writing elements ✓ accurate model ✓ organization

GRADE 9 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	24. Knows that specialized structures inside cells in most organisms carry out different functions, including (NM – II.II.III.2): • parts of a cell and their functions (e.g., nucleus, chromosomes, plasma, and mitochondria), • storage of genetic material in DNA, • similarities and differences between plant and animal cells, and • prokaryotic and eukaryotic cells. 25. Describes the mechanisms for cellular processes (e.g., energy production and storage, transport of molecules, waste disposal, synthesis of new molecules) (NM – II.II.III.3). 26. Knows how the cell membrane controls which ions and molecules enter and leave the cell based on membrane permeability and transport (i.e., osmosis, diffusion, active transport, passive transport) (NM – II.II.III.4). 27. Explains how cells differentiate and specialize during the growth of an organism, including (NM – II.II.III.5): • differentiation, regulated through the selected expression of different genes, and • specialized cells, response to stimuli (e.g., nerve cells, sense organs). 28. Knows that DNA directs protein building (e.g., role of RNA) (NM – II.II.III.6). 29. Describes how most cell functions involve chemical reactions, including (NM – II.II.III.7): • promotion or inhibition of biochemical reactions by enzymes • processes of respiration (e.g., energy production, ATP) • communication from cell to cell by secretion of a variety of chemicals (e.g., hormones).	✓ research strategies ✓ key concepts ✓ effective presentation ✓ teamwork/collaboration

STRAND III: THE CONTENT OF SCIENCE-EARTH AND SPACE
CONTENT STANDARD: The student understands the structure of Earth, the solar system, and the universe, the interconnections among them, and the processes and interactions of Earth's systems.

BENCHMARK: The student examines the scientific theories of the origin, structure, energy, and evolution of Earth and its atmosphere, and their interconnections.

GRADE 9 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	1. Describes the characteristics and the evolution of Earth in terms of the geosphere, the hydrosphere, the atmosphere, and the biosphere (NM – II.III.II.1).	1. The student researches (e.g., Internet, library) how scientists (e.g., Miller and Urey) have formulated their own ideas of geological time and the development of organic molecules and presents (e.g., PowerPoint, poster) findings to the class. ✓ individual participation ✓ thorough research ✓ current thoughts ✓ effective presentation OR The student explores current research and findings to study basic processes of radioisotope dating and other methods of dating (e.g., paleomagnetism). He/She presents when each method is best used and the limitations of each method. The paper/presentation should include when methods can be combined to strengthen evidence. √ thorough research √ support for position √ effective communication
	2. Understands the changes in Earth's past and the investigative methods used to determine geologic time, including (NM – II.III.II.4): • rock sequences, relative dating, fossil correlation, and radiometric dating , and • geologic time scales, historic changes in life forms, and the evidence for absolute ages (e.g., radiometric methods, tree rings, paleomagnetism).	2. The student investigates fossil remains of bacterial mats and other ancient life forms in rocks and reports findings to the class. After all reports are made, the class has a discussion to compare each other's findings. √ active participation in discussions √ personal presentation
	3. Knows that Earth's systems are driven by internal (i.e., radioactive decay and gravitational energy) and external (i.e., the sun) sources of energy (NM – II.III.II.6).	2, 3. As an introduction to the following activity, the student talks about carbon dating and establishes the fact that erosion takes a long time. With that in mind, the student designs a time scale based on known

GRADE 9 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
		uniformitarianism. ✓ accurate time scale ✓ comprehension of key concepts
	4. Describes the patterns and relationships in the circulation of air and water driven by the sun's radiant energy, including (NM – II.III.II.8): • patterns in weather systems related to the transfer of energy, • differences between climate and weather, • global climate, global warming, and the greenhouse effect, and • El Niño, La Niña, and other climatic trends.	4. As part of the study of biomes and climate, the student learns what a biome is, specific physical features and climates of biomes, what causes them to exist, and the kinds of plants and animals that coexist and survive in a particular area determined by its soil, topography, and climate of that area. Using provided diagrams and figures, the student learns about latitude and radiant energy, effects of large bodies of water, and the effects of mountains on climate. Using the data in a table of temperatures and rainfall in a variety of cities of the U. S., the student, working in small groups, selects one city and makes a graph of average temperature and average precipitation versus month of the year for that city. The student uses that information to classify each city in a biome (descriptive table is provided). The group then shares the graph and compares it to the other city graphs to determine differences in yearly temperature range, precipitation, and classification of biome. ✓ individual participation ✓ teamwork/collaboration ✓ interpretation of data ✓ effective presentation ✓ comparisons and contrasts ✓ insights
	5. Knows that Earth's system contains a fixed amount of natural resources that cycle among land, water, the atmosphere, and living things (e.g., carbon and nitrogen cycles, rock cycle, water cycle, ground water, aquifers) (NM – II.III.II.9). 6. Explains how layers of the atmosphere (e.g., ozone, ionosphere) change naturally and artificially (NM – II.III.II.11). 7. Explains how the availability of ground water through aquifers can fluctuate based on multiple factors (i.e., rate of use, rate of replenishment, surface changes, and changes in temperature) (NM – II.III.II.12).	5 – 7. The student, working in a group, creates a model showing the fluctuation, movement, and change of resources in the environment. To represent the different cycles, each student is assigned to a specific cycle (e.g., rock, water, carbon) and presents the model to the class. After each group has presented its model, each student examines all of the cycles and explains in writing the relationship among all of the cycles. ✓ individual participation ✓ teamwork/cooperation/collaboration ✓ accurate and realistic model representation ✓ effective presentation ✓ writing conventions and elements ✓ connections

STRAND IV: SCIENCE AND SOCIETY
CONTENT STANDARD: The student understands how scientific discoveries, inventions, practices, and knowledge influence, and are influenced by, individuals and societies.

BENCHMARK: The student examines and analyzes how scientific discoveries and their applications affect the world, and explains how societies influence scientific investigations and applications.

GRADE 9 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	1. Knows how science enables technology but also constrains it, and recognizes the difference between real technology and science fiction (e.g., rockets vs. antigravity machines; nuclear reactors vs. perpetual-motion machines; medical X-rays vs. Star-Trek tricorders) (NM – III.I.I.1).	1. Using a predetermined set of questions, the student participates in a Science Fiction – Science Fact Trivia game. For each response the student gives, he/she explains why he/she answered in that fashion. ✓ individual participation ✓ support for response
	2. Understands how advances in technology enable further advances in science (e.g., microscopes and cellular structure; telescopes and understanding of the universe) (NM – III.I.I.2). 3. Evaluates the influences of technology on society (e.g., communications, petroleum, transportation, nuclear energy, computers, medicine, genetic engineering) including both desired and undesired effects, and including some historical examples (e.g., the wheel, the plow, the printing press, the lightning rod) (NM – III.I.I.3). 4. Understands the scientific foundations of common technologies (e.g., kitchen appliances, radio, television, aircraft, rockets, computers, medical X-rays, selective breeding, fertilizers and pesticides, agricultural equipment) (NM – III.I.I.4).	2 – 4, 6, 10. The student researches a particular technological item (e.g., golf club, elevators, guitars) and, either orally or in written format, presents the origin of that item, changes based on technology, and the pros and cons of the development. ✓ thorough research ✓ all required components ✓ accuracy ✓ analysis and organization ✓ effective presentation Option: The instructor of the class can collaborate with the language arts teachers to work on either the speaking or the writing elements and conventions. This can be a duo project that satisfies certain requirements of both classes.
	5. Understands that applications of genetics can meet human needs and can create new problems (e.g., agriculture, medicine, cloning) (NM – III.I.I.5). 6. Analyzes the impact of digital technologies on the availability, creation, and dissemination of information (NM – III.I.I.6).	5, 11, 14 – 16. The student examines current news items (e.g., articles, TV, newspapers) on bioethics issues (e.g., cloning stem cell research). In small or large group discussions, the student discusses the particular stances, what ideas are out there, and benefits of having the information or advancement of the new knowledge. ✓ accurate account of news item ✓ differing viewpoints
	7. Describes how human activities have affected ozone in the upper atmosphere and how it affects health and the environment (NM – III.I.I.7).	7. See Strand III, the illustration for performance standards # 5 – 7.

GRADE 9 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	8. Describes uses of radioactivity (e.g., nuclear power, nuclear medicine, radiometric dating) (NM – III.I.I.8). 9. Describes how scientific knowledge helps decision makers with local, national, and global challenges (e.g., Waste Isolation Pilot Project [WIPP], mining, drought, population growth, alternative energy, climate change) (NM – III.I.I.9). 10. Describes major historical changes in scientific perspectives (e.g., atomic theory, germs, cosmology, relativity, plate tectonics, evolution) and the experimental observations that triggered them (NM – III.I.I.10). 11. Knows that societal factors can promote or constrain scientific discovery (e.g., government funding, laws and regulations about human cloning and genetically modified organisms, gender and ethnic bias, AIDS research, alternative-energy research) (NM – III.I.I.11). 12. Explains how societies can change ecosystems and how these changes can be reversible or irreversible (NM – III.I.I.12). 13. Describes how environmental, economic, and political interests impact resource management and use in New Mexico (NM – III.I.I.13). 14. Identifies how science has produced knowledge that is relevant to individual health and material prosperity (NM – III.I.I.15). 15. Understands that reasonable people may disagree about some issues that are of interest to both science and religion (e.g., the origin of life on Earth, the cause of the Big Bang, the future of Earth) (NM – III.I.I.16). 16. Identifies important questions that science cannot answer (e.g., questions that are beyond today's science, decisions that science can only help to make, questions that are inherently outside of the realm of science) (NM – III.I.I.17).	8. See Strand III, the illustration for performance standards # 2, 3. 9, 12, 13. The student listens to a guest speaker (e.g., someone from the Nature Center, NM Tech) talk about local environmental issues (e.g., Why is the vegetation dying in the Bosque?). After the lecture, the student develops an action plan that deals with a particular school environment problem (e.g., conservation of water). The plan must outline specifically what is to be done, how the plan affects the problem, and the benefits of the plan. ✓ understanding of an issue ✓ viability of plan ✓ specifics ✓ problem solving

GRADE 9 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	17. Understands that scientists have characteristics in common with other individuals (e.g., employment and career needs, curiosity, desire to perform public service, greed, preconceptions and biases, temptation to be unethical, core values including honesty and openness) (NM – III.I.I.18). 18. Knows that science plays a role in many different kinds of careers and activities (e.g., public service, volunteers, public office holders, researchers, teachers, doctors, nurses, technicians, farmers, ranchers) (NM – III.I.I.19).	17, 18. Integrated consistently in the curriculum throughout the year is the career connection. Current textbooks interject the "real-life" aspect and applications in almost every chapter, and the instructor takes every opportunity to insert that, whether it be through personal experiences or through questioning (e.g., What does a technician do? What is a phlebotomist?). The student talks about his personal career interest and explains where science is used in this career (e.g., mechanics, vet, park ranger). **OR** Either as a school-wide project or class project, the student participates in a Career Day Fair. The student listens to a variety of speakers (e.g., landscape people, electrician, forensics lab person) in the science fields talk about aspects of their jobs. After the fair, the student, either orally or in written format, summarizes one career field that held special interest to him/her, highlighting the science connection. Options: The student helps in the organization of the event by suggesting and contacting some of the guest speakers. Some of these speakers could be personal connections that he/she has (e.g., parents, former students). ✓ individual participation ✓ listening skills ✓ personal connections ✓ scientific significance to career fields ✓ effective presentation

STRAND V: LITERACY
CONTENT STANDARD: The student communicates biological principles through reading, writing, and speaking opportunities.

BENCHMARK: The student demonstrates proficiency in reading comprehension, specialized vocabulary, and a variety of writing and speaking requirements.

GRADE 9 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	1. Develops and demonstrates proficiency with the following strategies to approach reading for information across content areas (APS – LA I.1): • scans reading selection to determine whether a text contains relevant information, • uses the headings and subheadings of the material to make predictions and to validate comprehension of text, • reads and rereads to decode meaning, and • reviews and summarizes essential elements of text for overview. 2. Identifies and uses roots, prefixes, and suffixes to determine meaning of words (APS – LA I.4). 3. Uses textual evidence to develop and support an interpretation of a scientific process or concept (APS – LA II.2). 4. Develops increased competence in using the writing process to create a final product (APS – LA III.1). 5. Develops increased competence in using elements of effective writing (APS – LA III.2). 6. Supports an informed opinion (APS – LA III.6): • uses appropriate language, reasoning, and organizational structure for the audience and purpose, • provides relevant and convincing reasons, uses various types of evidence, and • demonstrates an awareness of possible questions, concerns, or counterarguments. 7. Responds to a variety of written, electronic, and other media (APS – LA III.7).	1 – 3. See Strand II, the illustration for performance standards # 9 – 16. See Strand III, the illustration for performance standard # 4. See Strand IV, 3rd illustration. 4 – 7. See Strand I, 1st illustration. See Strand II, illustration for performance standards # 23 – 29.

GRADE 9 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	8. Develops increased competence with speaking and language conventions (APS – LA IV.3). 9. Demonstrates appropriate discussion in group discussions (APS – LA V.2). 10. Evaluates the information, explanations, or ideas of others (APS – LA V.5). 11. Evaluates information to develop informed opinions (APS – LA VI.1). 12. Develops increased competence in using research strategies (APS – LA VI.5).	8. See Strand I, 1st illustration. See Strand II, the illustration for performance standards # 17 – 22. 9. See Strand II, 2nd illustration. See Strand III, the illustration for performance standards # 5 – 7. 10. See Strand V, the illustration for performance standards # 9, 12, 13, 17, and 18. 11, 12. See Strand I, 2nd illustration. See Strand II, the illustration for performance standards # 23 – 29. See Strand III, 1st illustration. See Strand IV, 2nd illustration. Although the above examples represent specific instances where the literacy standards are met, multiple opportunities are presented throughout the year and throughout the curriculum where the student demonstrates reading, speaking, writing, and research strategies. They are reflected in every strand.